Bleeding from an Arteriovenous Fistula or Graft UHL Renal Guideline/Pathway chart

University Hospitals of Leicester NHS
NHS Trust

RRCV CMG Renal and Transplant Service

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1. Introduction

Bleeding from an arteriovenous fistula or graft is potentially life threatening and deaths have occurred from uncontrolled bleeding. The blood is under arterial pressure and flows in an arteriovenous fistula/ Arteriovenous graft (AVF/AVG) are often greater than 1000ml/min. Any patient with bleeding, seepage, infection, ulceration, scabs of the skin over an AVF/AVG requires immediate referral for assessment by a senior doctor (i.e. SpR or above) in the Renal Unit in Glenfield Hospital or local renal ward and observation in hospital is often required following the pathway chart in this guideline and the admission note below it. The patient should be reviewed by a consultant before discharge. It is reported that 0.4-1.6% of all deaths on HD have been attributed to fatal vascular access haemorrhages (FVAHs). In the US, more than 200 deaths per year are attributed to FVAHs for HD patients. Half of these occur in patients with AVFs. 75% of FVAHs occur whilst the patient is away from the HD unit/hospital.
Therefore, predicting those who are at high risk of bleeding requires joint care and careful assessment by the nephrology and surgical teams. Patient and/or carers should be provided with UHL care of the haemodialysis fistula leaflet (or equivalent). Education is vital to ensure awareness of how to manage an access haemorrhage at home.

Following on from recent M&M cases in relation to bleeding AVF/AVGs, this information has been collated to improve the assessment and management of AVF/AVGs at risk of bleeding.

In general the majority of AV access fatal bleeding is due to spontaneous access rupture away from the dialysis facility. Rarely do such events happen without warning and one purpose of this guideline is to ensure ongoing awareness of this serious complication of dialysis treatment amongst healthcare professionals and patients/carers.

2. Scope

These guidelines are designed to give guidance on assessing risk of and managing haemodialysis access haemorrhage.

3. Recommendations, Standards and Procedural Statements

3.1 Risk Factors

Risk Factors for AV access bleeding may operate independently or in combination.

3.1.1 History

High risk

- Previous access haemorrhage (herald bleed)

- Prolonged bleeding post-HD
- Bleeding around needle sites
- Pseudoaneurysms
- Aneurysmal formation. Sudden increase in size
- Problems with skin integrity: Shiny, Thinning, breach.
- Infection leads to weakening of the vessel wall, increasing the subsequent risk for. It is an important risk factor due to interference of the usual repair mechanisms leading to weakness in the vessel wall, potential for subsequent aneurysm or pseudoaneurysm formation, and risk for eventual rupture bleeding.
- Scabbing over the AVF.
- Problematic use of AV access for dialysis.

Moderate-Low risk

Access related:

- Type of access: AV Grafts (AVG) are at higher risk than AVF. AVG are prone to pseudoaneurysm formation than AVFs due to their higher intra-access pressure and flow. Pseudoaneurysm formation increases the likelihood of spontaneous rupture of the vessel.
- Site of Access: Thigh AVG or AVF due to the large vessel size and consequent higher blood flow and intra-access pressure making it more difficult to control bleeding.
- Access interventions: Declotting or repair within previous 12 months.

Patient Related:

- Multiple comorbidities
- Medications (antiplatelet, Anticoagulants, Steroid and immunosuppression medications)
- Reduced cognitive function and/or physical ability to self-manage an initial bleed.

Dialysis Facility related

- It should be recognised that duration of bleeding from an AVF may well be shorter on the dialysis unit compared to if it had happened at home because of the professionals involved. Both must be taken extremely seriously. Bleeding for more than 20 minutes post needle removal should be referred.

3.1.2 Examination

3.1.2.1 Aneurysm and Pseudoaneurysm

These may be caused by pre or post aneurysmal stenosis, frequent needling and in patients on steroids.

Review for following signs:

- colour change - in darker skinned individuals this result in separation of pigment

- very high risk if ulcerated over the aneurysmal site - impending rupture
- increasing size -as an aneurysm increases in size it becomes shinier – think of a balloon
- Deranged HD parameters especialy venous hypertension
    - deflated - opaque and dull
    - inflated - shiny and tight
- Palpate either side of the aneurysm - is it soft or firm?
    - firmness suggests higher pressure in the 'balloon' and therefore higher risk of bursting i.e. sudden, high volume haemorrhage
- compare the original vessel diameter to the base of the aneurysm
    - if >3 times the original size further evaluation of the access site should be undertaken

3.1.2.2 Pseudoaneurysms

It results from persistent subcutaneous bleeding that walled off over time with communication with the AV access. The skin acts as a dressing for the haematoma, particularly as it enlarges, as it progresses further it may lead to skin breakdown/ulceration too.

3.1.3 Skin

Review skin integrity. Risk is increased in the case of:

- Overlying cellulitis/infection
- Non healing scab or ulceration of tissue – high risk of rupture.
- Change in pigmentation
- Evidence of trauma or erosion
-

3.1.4 Stenosis

A stenosis increases the pressure within the access (effectively localised hypertension within the AVF). This can be assessed by the 'Arm Raise Technique'.

Patient raises arm above head

- AVF immediately flattens out - unlikely to be significant stenosis
- proximal portion flattens but distal part distends - suggests a stenosis at the point of distension

The patient should be investigated further (Doppler US/Fistulogram) for AV access Radiological/Surgical Rescue.

3.2 Management

<u>Patients presenting with vascular access problems must have a surgical review and should not be discharged without a senior (SpR or consultant) nephrology and surgical opinion</u>.

3.2.1 All patients with an AV access should receive education and a bleeding risk card including

- signs and symptoms of above risk factors including infection
- how to deal with a AVF bleed
    - seek help
    - elevate access limb

        - direct pressure over area of rupture:
    - at least 20 minutes with pressure (i.e. do not release pressure to check site)
    - do not delay pressure to find bandage/gauze
    - do not wrap towel around site risk of ‘wicking’ and worsening bleeding and risk of tourniquet related ischaemia
- access should be reviewed ASAP
    - Dial 999 and advise bleed occurring from a dialysis fistula.
    - if bleed stops quickly patient should still be advised to make immediate contact with usual HD unit if in hours or ward if out of hours and then directed to attend for a review.

- Access rotation of needling site will improve the evenness of the AVF dilation
    - rest areas if signs of infection/ulceration and seek medical review
    - doTry to avoid needling aneurysmal site whenever possible and if AVF length allows: take photograph(s) of the patients AV access if patients complain of pain, redness, swelling or if there are any concerns about the appearance of the fistula/skin or the needling sites. Photographs should be reviewed by SPR/consultant and escalation for further investigations/treatment Photographs to be repeated and compared on each attendance to provide permanent record and guide management until problem resolved (UHL written consent form for photography to be completed and filed in notes).

- Medications
    - review medications
        - Little warfarin and other anticoagulants used either for access patency or medical indications. Assess Coagulation profile as below
        - aspirin, clopidogrel etc

- **Investigations**
    - clotting - INR, APTT, platelets
    - if blood loss - Hb (bearing in mind most pts will be anaemic prior to any blood loss)
    - HD parameter noticing recent changes
    - imaging
        - US
            - Flow, patency/size of AVF
            - may be useful in identifying alternative needling sites
        - fistulogram+/-plasty

-Surgical intervention

- KDOQI guidance for referring to surgeons
    - aneurysms
    - compromised skin over AVF
    - risk of rupture
    - limited availability of puncture sites
    - pseudoaneurysms
        - Of any size in relation to the graft
    - haemostasis difficult post-HD
    - If radiological intervention was not feasible to rescue problematic AV Access
    - spontaneous site bleeding
- Consideration of ligation if it is lifesaving. But, high priority should be given to rescue of the graft if appropriate.

3.4 Suggested reasons for immediate admission for vascular access problems.

An actively bleeding AVF/G should be managed within the local emergency department. A patient with an AVF/AVG of concern should be admitted, without delay to any available bed on the renal unit. If admitting to Leicester available 'hot' beds on ward 30 GH are permitted to be used for this purpose. The operational team should be informed if no bed is available. Diversion to the emergency department is an exceptional decision that should be taken by the consultant(s) on call.

Reasons for admission include;

- Any evidence of active bleeding
- Previous haemorrhage or infection of the access in last 6 months
- Ulceration/infection/scabs of access - especially if it is over a non-needling site
- Stenosis leading to localised raised pressure in the access
- Systemic hypertension (there is no evidence in the literature regarding a threshold of systolic BP where haemorrhage becomes more likely)
- Deranged clotting
- Shiny/taut skin over fistula suggesting imminent rupture of AVF
- Acutely enlarging aneurysmal AVF

4. Education and Training

All staff caring for patients with advanced chronic kidney disease should be familiar with the contents of this guideline**.**

5. Monitoring and Audit Criteria

Key Performance Indicator	Method of Assessment	Frequency	Lead
Episodes of AVF/AVG bleeding	Datix incidents	Ad hoc	HD matrons
Implementaion of pathway	Audit to be undertaken for by a	After 3 months	Transplant Registrar

6. Legal Liability Guideline Statement

See section 6.4 of the UHL Policy for Policies for details of the Trust Legal Liability statement for Guidance documents If applicable

7. Supporting Documents and Key References

- Ellingson KD. Vascular access hemorrhages contribute to deaths among hemodialysis patients. Kidney International (2012) 82, 686–692; doi:10.1038/ki.2012.185; published online 13 June 2012. http://www.nature.com/ki/journal/v82/n6/full/ki2012185a.html
- MD Jose et al. Fatal Dialysis Vascular Access Hemorrhage. Am J Kidney Dis

(2017)

- Editor's Choice - J Schmidli et al. Vascular Access: 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS), Eur J Vasc Endovasc Surg (2018)

Arteriovenous vascular Access Pathway

AV Access Bleeding

At Home

1- Call 999

2- Direct compression on bleeding point and below and above it

3- Don't use blood absorbing fabric

4- Don't use tourniquet or blood pressure cuff

5- Follow instruction in patient bleeding risk card

6- After emergency care, refer to the on-call Renal and Transplant surgical team in Glenfield Hospital

In Dialysis Facility

1- Follow preventive/ educational measures explained

2- Massive bleeding: Call 999

3- Direct compression on bleeding point for up to 30 minutes

4- If bleeding persists call the on call nephrology team in Glenfield Hospital immediately and arrange referral

5- Nephrology team to call Transplant team on-call while the patients are in their way and arrange for blood investigations (FBC, U&Es and clotting …etc)

In the Ward in Hospital

Post-operative/post intervention Bleeding:

1- Immediate review/emergency care by the ward team/on-call registrar
2- Escalation to on call transplant consultant
3- Arrange for surgical intervention.

Under Renal care or on Dialysis in the Ward:

Follow the instruction under (upon arrival to Glenfield Hospital.

Upon arrival to Glenfield Hospital

1- Immediate simultaneous clinical review by the on call nephrology/Transplant teams whenever possible (unavailability of transplant members due to theatre work/off site on-call shouldn't delay patient assessment and emergency care.
2- Escalate to Renal/Transplant consultants on call if review is delayed or consultant review is needed immediately.
3- Provide emergency care as required, request investigations and arrange for admission as per guidance and infection control advice.
4- Document referral times and care stages in patient notes.
5- Arrange immediate Surgical intervention if required: Bed side stitches, in theatre surgical intervention
6- The patient should have consultant review either by escalation or in ward rounds before discharge with clear future plan if needed

-Patient to be admitted into any available bed, but sequence is as follows, firstly onto Ward 27 or Ward 30 and, if no bed on Renal wards, onto Ward 37' (but cannot breech green pathway)
- Based on evolving electronic systems: a paper pathway could be considered to be implemented

1. Key Words

Vascular access, arteriovenous fistula, arteriovenous graft, bleeding, haemorrhage

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12.11.19	2	Suzi Glover, Richard Baines	Included risk of bleeding around needle sites
08.01.2023	2	Mohamed Morsy	Added Pathway flow chart after team discussion and updated the guideline

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